Natural Gas and Oil Programs

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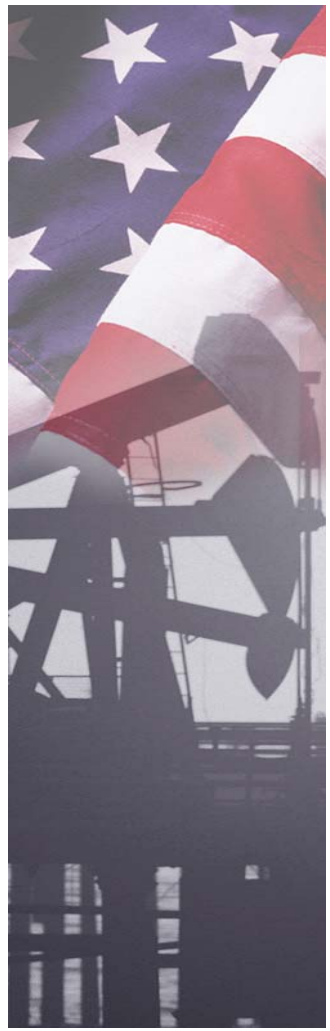
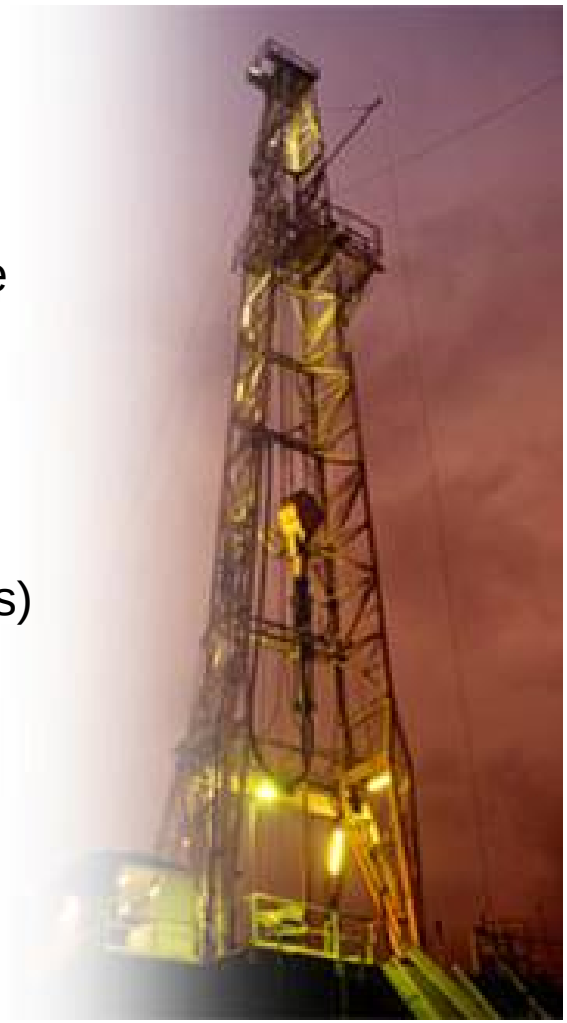
Oil and Gas Program Provides Value for America

- Natural Gas and Oil are critical to the U.S. economy
- Significant price increases are possible in the future
- New supplies will be more difficult/costly
- Technology development can bring new supplies to the market and improve the environment
- Monumental task requiring many disciplines and a partnership approach



U.S. Gas & Oil Supply Faces Challenges

- **Natural Gas**
  - Imports rising (23% of consumption in 2004)[1]
  - Flat production despite record drilling
  - Remaining resource increasingly costly to produce
  - 88% of pipeline system installed prior to 1970s[2]
- **Oil**
  - Imports rising (65% now; 77% expected in 2025)[3]
  - Recoverability still low (~30% of in-place resources)
- **Environmental issues**
  - Competing land use/access restrictions
  - Finding sites for new pipelines/facilities difficult
  - More drilling w/today's technology = more impact



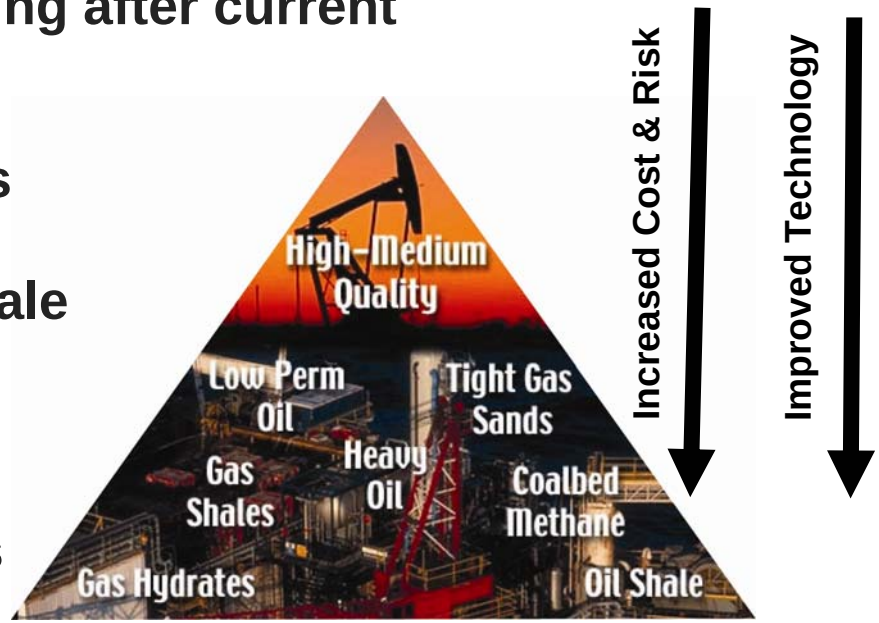
1. DOE EIA Website; 2. NPC 2003; 3. DOE EIA 2005

Vast Domestic Resource Available

More Difficult & Costly to Produce

OIL

- **100's Billion bbl in-place: Remaining after current recovery methods**
  - Awaiting advanced technologies
- **10's Billion bbl in-place: Oil Sands**
  - Awaiting technology development
- **1000's Billion boe in-place: Oil Shale**
  - Economic and environmental hurdles

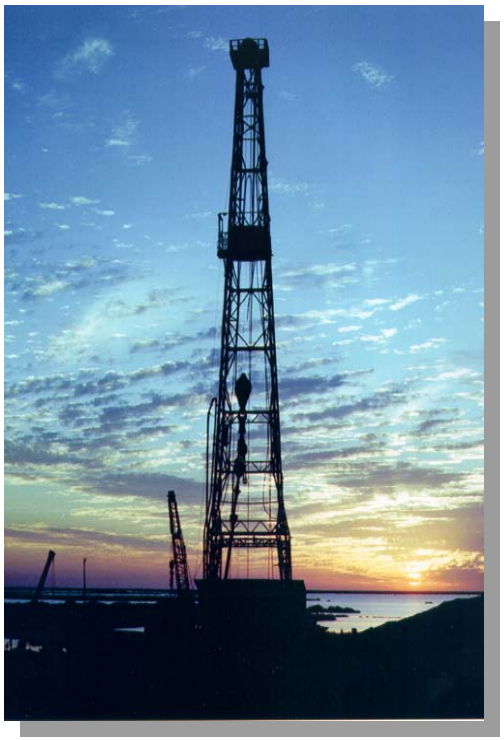


GAS

- **100's Tcf in-place: Ultra-Deep Gas**
  - Recoverable, but not economic
- **1000's Tcf in-place: Tight Gas Sands**
  - 2% recoverable now; how much higher?
- **100,000's Tcf in-place: Methane Hydrates**
  - Recoverability not established

Strategic Center for Natural Gas & Oil

Implement science and technology programs that resolve the environmental, supply and reliability constraints of oil and natural gas resources and enhance our energy security



- **Create public benefits by investing in research that industry would not take on itself**
- **Deliver a balanced portfolio of technology to:**
  - **Efficiently produce discovered resources**
  - **Recover entirely new sources of supply**
  - **Overcome environmentally-driven policy impediments**
  - **Reliably and safely deliver to end user**

A Multi-discipline, Long-Term, High-Risk, and High-Reward endeavor that will only occur through Federal involvement.

Strategic Center for Natural Gas & Oil
Outline of R&D Responsibilities

Office of Petroleum

Exploration & Production

Reservoir Life Extension

Petroleum Environmental Solutions

Office of Natural Gas

Exploration & Production

Delivery, Reliability, Storage & LNG

Methane Hydrates

Arctic Energy Office

Petroleum Systems Analysis & Planning

Natural Gas and Oil Technology Programs

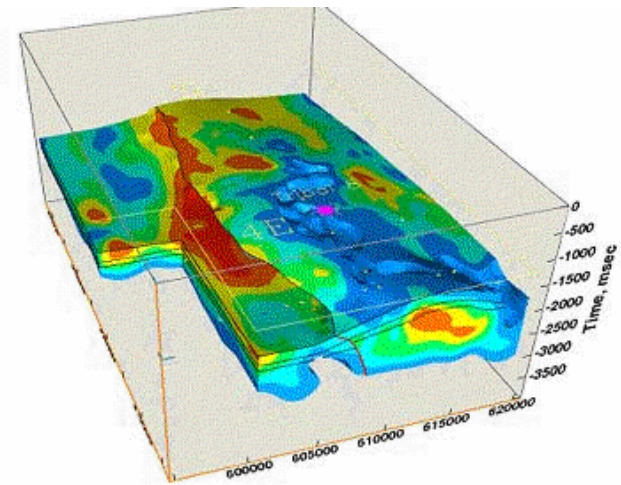
Budget ($ million)

	FY04	FY05
Exploration and Production	21.6	23.7
Gas Hydrates	9.2	9.4
Infrastructure	8.7	8.4
Effective Environmental Protection	2.4	3.5
TOTAL – NATURAL GAS	*41.8*	*44.8*
Exploration and Production	17.9	18.7
Reservoir Life Extension	6.7	5.9
Effective Environmental Protection	9.4	9.3
TOTAL - OIL	*34.1*	*33.9*
TOTAL – NATURAL GAS AND OIL	*75.9*	*78.7*

Oil and Gas Exploration & Production

Protecting the Environment while Lowering Costs

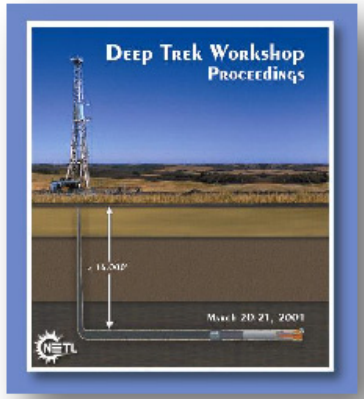
- **Drilling, Completion & Stimulation**
  - Increase rate of penetration
  - More durable tools
  - Innovative concepts
  - Smarter



- **Advanced Diagnostics & Imaging Systems**
  - Natural fracture detection
  - Resource Assessments
  - Advanced Seismic

DeepTrek Program

Extreme Tools for Extreme Environments



- **Purpose**
  - Develop very deep drilling and completion technologies
  - High-temp (450^{o}F), high pressure, hard rock, corrosive environment
- **Projects**
  - High-temperature downhole electronics (Honeywell)
  - High-temperature/high pressure MWD (Schlumberger)
  - Super cement (Cementing Solutions)
  - Downhole vibration monitoring & control (APS Technology)
  - Advanced bits and fluids benchmarking (TerraTek)
- **Breakthrough**
  - New high-temp electronic component developed March 05

Oil and Gas E&P

Helping the Small Producer

- **Stripper Well Consortium**
  - Reduce premature abandonment of wells
  - 65 members participate in technology development & deployment
  - Several new low-cost technologies already introduced

- **Petroleum Technology Transfer Council**
  - Assure full utilization of technologies
  - 10 regional producer advisory groups
  - 150 workshops/year
  - 18,000 industry contacts

Reservoir Life Extension Program

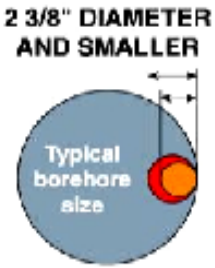
Microhole Technologies

Micro-Electromechanical Systems (MEMS)

Micro Drillrig

Downhole Systems

Relative Borehole Sizes

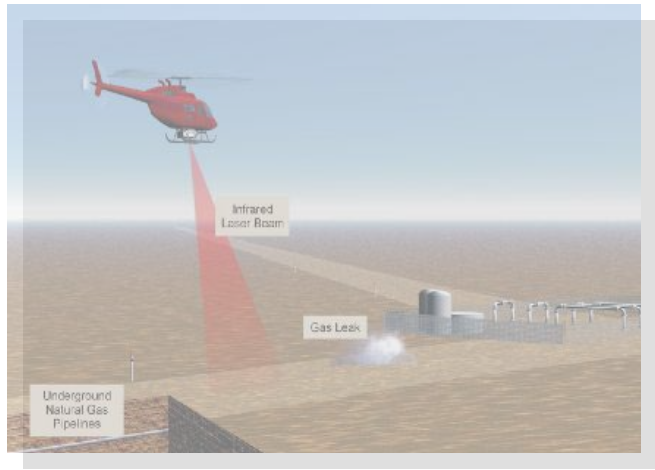


- **Wellbore one-twentieth that of a typical rig and will cost about 90% less**
- **Lower environmental impact – 20% reduction in drilling fluids and cuttings**
- **Change the way we explore for and produce oil and gas**

Natural Gas Infrastructure Program

Pipelines & Storage

- **Goals**
  - 30% reduction in leaks
  - 20% increase in capacity
  - Improved environment
  - Increased deliverability
- **Activities**
  - Remote leak detection
  - Internal pipeline inspection
  - Improved operational efficiency
  - Improved/new storage



Oil and Gas Environmental Program

Technology and policy solutions for environmental barriers that limit domestic production

- **Federal Lands Access**
  - Reduce permitting Times
  - Science-based Stipulations
- **Coal Bed Natural Gas - Water Issues**
  - Treatment technologies
  - Educational materials
- **Air and Water Emissions**
  - Treatment technologies
  - Measurement techniques
  - Streamline permitting
  - Educational materials

Methane Hydrates

- **Program addresses**
  - Safety & seafloor stability
  - Global climate impacts
  - Production technologies

- **Huge resources:**
  - 200,000 Tcf domestic gas-in-place
    - *If 1% can be rendered economic will double nation's supply of gas*
- **Sustainable energy future**
  - Gas becomes key transition fuel
  - Improved economy
  - Reduced dependence on foreign energy

Internet Location: **netl.doe.gov/scngo/index.html**